EXHIBIT 8

INVALIDITY CONTENTIONS FOR U.S. PATENT NO. 7,177,369 BASED ON "ADAPTIVE MULTICARRIER MODULATION: A CONVENIENT FRAMEWORK FOR TIME-FREQUENCY PROCESSING IN WIRELESS COMMUNICATIONS," BY T. KELLER ET AL. ("KELLER")

Based upon Plaintiff's Complaint, Infringement Contentions, and apparent claim constructions and application of the claims to Defendant's accused products, as best as they can be deciphered, the reference charted below anticipates or at least renders obvious the asserted claims. These invalidity contentions are not an admission by the Defendant that the accused products are covered by or infringe the asserted claims, particularly when these claims are properly construed and applied. These invalidity contentions are not an admission that the Defendant concedes or acquiesces to any claim construction implied or suggested by Plaintiff's Complaint or Infringement Contentions. Nor is Defendant asserting any claim construction positions through these charts, including whether the preamble is a limitation. The portions of the prior art reference cited below are not exhaustive but are exemplary in nature.

"Adaptive Multicarrier Modulation: A Convenient Framework for Time-Frequency Processing in Wireless Communications," by T. Keller et al., IEEE Proceedings of the IEEE, Vol. 88, No. 5, at pp. 611-640 ("Keller") published in May, 2000. This paper is prior art under at least 35 U.S.C. § 102(b), and 103(a). As described in the following claim chart, the asserted claims of U.S. Patent No. 7,177,369 (the "'369 Patent"), are invalid as anticipated by Keller.

To the extent that Keller is found not to anticipate one or more of the asserted claims of the '369 Patent, these claims are invalid as obvious in view of Keller alone or in combination with other prior art references disclosed in Defendant's Invalidity Contentions and accompanying charts, including without limitation Minn and/or Lehne.

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Claim 1	
1[p] A method comprising:	To the extent the preamble is limiting, Keller discloses this claim limitation explicitly, inherently, or as a matter of common sense, or it would have been obvious to add missing aspects of the limitation. For example, see the following passages and/or figures, as well as all related disclosures:

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	“Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[a] identifying at least one multipath transmission delay within a reverse path data signal received from a receiving device;	Keller discloses identifying at least one multipath transmission delay within a reverse path data signal received from a receiving device. For example, see the following passages and/or figures, as well as all related disclosures: “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by

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	transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “While OFDM transmissions over mobile communications channels can alleviate the problem of multipath propagation, recent research efforts have focused on solving a set of inherent difficulties regarding OFDM, namely, on reducing the associated the peak-to-mean-power ratio fluctuation, on time and frequency synchronization and on mitigating the effects of cochannel interference sensitivity in multiuser environments.” Keller at p. 612 “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be

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	exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel.” Keller at p. 629 “Different techniques can be employed to estimate the channel quality. For OFDM modems, the bit-error probability in each subcarrier is determined by the fluctuations of the channel’s current frequency-domain channel transfer function with the aid of the channel transfer function H_n with the aid of the channel transfer function estimates provided by the pilot symbols, provided that no interference is present.” Keller at pp. 628-629 “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency $f^{\prime}_d$. The ensemble of the propagation p paths constitutes the impulse response” Keller at p. 615.

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	“The impulse response was determined by simple ray-tracing in a warehouse-type environment and is shown in Fig. 3(a), where each CIR tap corresponds to a specifically delayed propagation path. We note that this indoor CIR is not particularly dispersive; however, at the 155-Mb/s WATM rate, the dispersion corresponds to 11 sample periods, which would require a high-performance channel equalizer in a serial modem. The last CIR path arrives at a delay of 48.9 ns due to the reflection with an excess path length of about 15 m with respect to the line-of-sight path, which again, corresponds to 11 sample periods.” Keller at p. 616. “In the Median system, the OFDM FFT length is 512, and each symbol is padded with a cyclic prefix of length 64. The sampling rate of the Median system is 225 Msamples/s, and the carrier frequency is 60 GHz. The uncoded target data rate of the Median system is 155 Mb/s.” Keller at p. 615. “As a further conceptual augmentation of the above ideas, let us consider the following example. The associated channel SNR of an adaptive OFDM modem is shown in a three-dimensional form in Fig. 15, which was generated with the aid of the FFT of the Rayleigh-faded CIR of Fig. 3.” Keller at p. 627. “The channel quality estimation can be acquired from a range of different sources. If the communication between the two stations is bidirectional and the channel can be considered reciprocal, then each station can estimate the channel quality on the basis of the received OFDM symbols and adapt the parameters of the local transmitter to this estimation.”

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	Keller at p. 628. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel.” Keller at p. 629. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634. “An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function.” Keller at p. 633. “Since no equalization is performed, there is no noise amplification at the receiver. Similarly to the adaptive modulation techniques illustrated above, preequalization is

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	only applicable to a duplex link, since the transmitted signal is adapted to the specific channel conditions perceived by the receiver.” Keller at p. 634. “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas.” Keller at p. 611. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, Lehne and/or Minn. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[b] determining at least one forward path pre-equalization parameter based on said at least one transmission delay; and	Keller discloses determining at least one forward path pre-equalization parameter based on said at least one transmission delay. The Court has construed “forward path pre-equalization parameter” as “a pre-equalization parameter for modifying a forward path signal to reduce unwanted effects associated with multipath fading between the transmitter and receiver.”

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	For example, Keller discloses a preequalization parameter such as the preequalization function E_n,, which is based on the inverse of the channel transfer function: “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634. The channel transfer function, discussed above in [1a], is based on a channel impulse response which may be implemented using an FIR filter with time-varying tap values: “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency f'_d. The ensemble of the propagation p paths constitutes the impulse response” Keller at p. 615. For example, see the following passages and/or figures, as well as all related disclosures: “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response

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	(CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “While OFDM transmissions over mobile communications channels can alleviate the problem of multipath propagation, recent research efforts have focused on solving a set of inherent difficulties regarding OFDM, namely, on reducing the associated the peak-to-mean-power ratio fluctuation, on time and frequency synchronization and on mitigating the effects of cochannel interference sensitivity in multiuser environments.” Keller at p. 612 “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality

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	on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel.” Keller at p. 629 “Different techniques can be employed to estimate the channel quality. For OFDM modems, the bit-error probability in each subcarrier is determined by the fluctuations of the channel’s current frequency-domain channel transfer function with the aid of the channel transfer function H_n with the aid of the channel transfer function estimates provided by the pilot symbols, provided that no interference is present.” Keller at pp. 628-629 “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency f'_d. The ensemble of the propagation p paths constitutes the impulse response” Keller at p. 615.

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	“The impulse response was determined by simple ray-tracing in a warehouse-type environment and is shown in Fig. 3(a), where each CIR tap corresponds to a specifically delayed propagation path. We note that this indoor CIR is not particularly dispersive; however, at the 155-Mb/s WATM rate, the dispersion corresponds to 11 sample periods, which would require a high-performance channel equalizer in a serial modem. The last CIR path arrives at a delay of 48.9 ns due to the reflection with an excess path length of about 15 m with respect to the line-of-sight path, which again, corresponds to 11 sample periods.” Keller at p. 616. “In the Median system, the OFDM FFT length is 512, and each symbol is padded with a cyclic prefix of length 64. The sampling rate of the Median system is 225 Msamples/s, and the carrier frequency is 60 GHz. The uncoded target data rate of the Median system is 155 Mb/s.” Keller at p. 615. “As a further conceptual augmentation of the above ideas, let us consider the following example. The associated channel SNR of an adaptive OFDM modem is shown in a three-dimensional form in Fig. 15, which was generated with the aid of the FFT of the Rayleigh-faded CIR of Fig. 3.” Keller at p. 627. “The channel quality estimation can be acquired from a range of different sources. If the communication between the two stations is bidirectional and the channel can be considered reciprocal, then each station can estimate the channel quality on the basis of the received OFDM symbols and adapt the parameters of the local transmitter to this estimation.”

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	Keller at p. 628. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel.” Keller at p. 629. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634. “An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function.” Keller at p. 633. “Since no equalization is performed, there is no noise amplification at the receiver. Similarly to the adaptive modulation techniques illustrated above, preequalization is

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	only applicable to a duplex link, since the transmitted signal is adapted to the specific channel conditions perceived by the receiver." Keller at p. 634. "High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas." Keller at p. 611. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, Lehne and/or Minn. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[c] modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter, where said modifying includes selectively setting	Keller discloses modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter, where said modifying includes selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal.

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different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal.	For example, see the following passages and/or figures, as well as all related disclosures: “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier *n*, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel. Unlike frequency-domain equalization at the receiver—which corrects for the amplitude and phase errors inflicted upon the subcarriers by the channel—spectral preequalization at the OFDM transmitter can deliver near-constant signal-to-noise levels for all subcarriers. Hence the above concept can be interpreted as power control on a subcarrier-by-subcarrier basis.” Keller at p. 629. “If the channel’s frequency-domain transfer function is to be fully counteracted by the spectral preequalization upon adapting the subcarrier power to the inverse of the channel transfer function, then the output power of the transmitter can become excessive, if heavily faded subcarriers are present in the system’s frequency range. In order to limit the transmitter’s maximal output power, hybrid channel preequalization and adaptive modulation schemes can be devised, which would deactivate transmission in deeply faded subchannels, while retaining the benefits of preequalization in the remaining subcarriers.” Keller at p. 629.

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	“As discussed above, the received data symbol of subcarrierover a slowly time-varying time-dispersive channel can be characterized by $R_n = S_n \cdot H_n + n_n$ (28) where S_n transmitted data symbol; H_n channel transfer function of subcarrier n; n_n noise sample. ” Keller at p. 633. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission. At the receiver, no equalization is performed; hence the received symbols can be expressed as $R_n = S_n \cdot E_n \cdot H_n + n_n.$ (30) Since no equalization is performed, there is no noise amplification at the receiver. Similarly to the adaptive modulation techniques illustrated above, preequalization is only applicable to a duplex link, since the transmitted signal is adapted to the specific channel conditions perceived by the receiver. As for other adaptive schemes, the transmitter needs an estimate of the current frequency-domain channel transfer function, which can be obtained from the received signal in the reverse link, as seen in Fig. 17.” Keller at p. 634. “Direct channel inversion at the transmitter is not practical, as the output power fluctuations are prohibitive; excluding those subcarriers that are faded too low can be used to limit the necessary transmit power. Analogously to the adaptive modulation schemes above, the transmitter decides for all subcarriers in each subband whether to transmit data or not. If preequalization is possible under the power constraints, then

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	the subcarriers are modulated with the preequalized data symbols. The information on whether a subband is used for transmission or not is signaled to the receiver. Since no attempt is made to transmit in the subbands that cannot be preequalized, the power not employed in the blank subcarriers can be used for “boosting” the data-bearing subbands. This scheme allows for a more flexible preequalization algorithm than the fixed-threshold-based method described above, which is summarized as follows. • Calculate the necessary transmit power p_n for each subband , assuming perfect preequalization.” Keller at p. 634. “The adaptive modem employing preequalization (PE) significantly outperformed the other uncoded adaptive schemes and offered a throughput of 0.18 BPS at an SNR of 0 dB, although its crest-factor PDF is slightly less attractive. The coded transmission schemes suffered from limited throughput at high SNR values, since the half-rate channel coding limited the data throughput to 2 BPS. For low SNR values, however, the coded schemes offered better performance than the uncoded schemes, with the exception of the “speech” SL-adaptive coded scheme, which was outperformed by the uncoded PE-adaptive modem. The poor performance of the coded SL-scheme can be explained by the lower uncoded target BER of the “speech” scenario, which was 1%, in contrast to the 10% uncoded target BER for the coded BER- and PE-adaptive schemes. The coded PE-adaptive modem outperformed the target-BER adaptive scheme, thanks to its more accurate control of the uncoded BER, leading to a higher throughput for low SNR values.” Keller at p. 637. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex

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	stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Direct channel inversion at the transmitter is not practical, as the output power fluctuations are prohibitive; excluding those subcarriers that are faded too low can be used to limit the necessary transmit power. Analogously to the adaptive modulation schemes above, the transmitter decides for all subcarriers in each subband whether to transmit data or not. If preequalization is possible under the power constraints, then the subcarriers are modulated with the preequalized data symbols. The information on whether a subband is used for transmission or not is signaled to the receiver.” Keller at p. 634. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, Lehne and/or Minn. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

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2. The method as recited in claim 1, further comprising: receiving said reverse path data signal over at least one reverse transmission path.	Keller discloses receiving said reverse path data signal over at least one reverse transmission path. For example, see the following passages and/or figures, as well as all related disclosures: “The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation.” Keller at p. 611. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency f'_d. The ensemble of the propagation p paths constitutes the impulse response”

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	Keller at p. 615. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, Lehne, Minn, and/or Wong. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
3. The method as recited in claim 2, further comprising: transmitting said modified forward path data signal over at least one forward transmission path.	Keller discloses transmitting said modified forward path data signal over at least one forward transmission path. For example, see the following passages and/or figures, as well as all related disclosures: “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.”

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	Keller at p. 629 “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency f'_d. The ensemble of the propagation p paths constitutes the impulse response” Keller at p. 615. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
4. The method as recited in claim 1, wherein said reverse path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division	Keller discloses wherein said reverse path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.

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Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.	For example, see the following passages and/or figures, as well as all related disclosures: “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “In [110] and [109], the two communicating stations use the open-loop predicted channel transfer function acquired from the most recent received OFDM symbol, in order to allocate the appropriate modulation modes to the subcarriers. The modulation modes were chosen from the set of BPSK, QPSK, 16-QAM, as well as “No Transmission,” for which no signal was transmitted.” Keller at p. 630. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been

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	obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
5. The method as recited in claim 1, wherein said modified forward path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.	Keller discloses The method as recited in claim 1, wherein said modified forward path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data. For example, see the following passages and/or figures, as well as all related disclosures: “While OFDM transmissions over mobile communications channels can alleviate the problem of multipath propagation, recent research efforts have focused on solving a set of inherent difficulties regarding OFDM, namely, on reducing the associated the peak-to-mean-power ratio fluctuation, on time and frequency synchronization and on mitigating the effects of cochannel interference sensitivity in multiuser environments.” Keller at p. 612 “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be

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	exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Different techniques can be employed to estimate the channel quality. For OFDM modems, the bit-error probability in each subcarrier is determined by the fluctuations of the channel’s current frequency-domain channel transfer function with the aid of the channel transfer function H_n with the aid of the channel transfer function estimates provided by the pilot symbols, provided that no interference is present.” Keller at pp. 628-629 “In the Median system, the OFDM FFT length is 512, and each symbol is padded with a cyclic prefix of length 64. The sampling rate of the Median system is 225 Msamples/s, and the carrier frequency is 60 GHz. The uncoded target data rate of the Median system is 155 Mb/s.” Keller at p. 615. “As a further conceptual augmentation of the above ideas, let us consider the following example. The associated channel SNR of an adaptive OFDM modem is shown in a three-dimensional form in Fig. 15, which was generated with the aid of the FFT of the Rayleigh-faded CIR of Fig. 3.” Keller at p. 627. “The channel quality estimation can be acquired from a range of different sources. If the communication between the two stations is bidirectional and the channel can be considered reciprocal, then each station can estimate the channel quality on the basis

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	of the received OFDM symbols and adapt the parameters of the local transmitter to this estimation.” Keller at p. 628. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634. “An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function.” Keller at p. 633. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been

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	obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
6. The method as recited in claim 5, wherein said modified forward path data signal includes sub-carrier pre-equalized OFDM data.	Keller discloses wherein said modified forward path data signal includes sub-carrier pre-equalized OFDM data. For example, see the following passages and/or figures, as well as all related disclosures: “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel. Unlike frequency-domain equalization at the receiver—which corrects for the amplitude and phase errors inflicted upon the subcarriers by the channel—spectral preequalization at the OFDM transmitter can deliver near-

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	constant signal-to-noise levels for all subcarriers. Hence the above concept can be interpreted as power control on a subcarrier-by-subcarrier basis.” Keller at p. 629. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
7. The method as recited in claim 6, further comprising: generating corresponding Quadrature Phase Shift Keying (QPSK) modulation values based on said sub-carrier pre-equalized OFDM data.	Keller discloses generating corresponding Quadrature Phase Shift Keying (QPSK) modulation values based on said sub-carrier pre-equalized OFDM data. For example, see the following passages and/or figures, as well as all related disclosures: “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. “While OFDM transmissions over mobile communications channels can alleviate the problem of multipath propagation, recent research efforts have focused on solving a

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	set of inherent difficulties regarding OFDM, namely, on reducing the associated the peak-to-mean-power ratio fluctuation, on time and frequency synchronization and on mitigating the effects of cochannel interference sensitivity in multiuser environments.” Keller at p. 612 “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Different techniques can be employed to estimate the channel quality. For OFDM modems, the bit-error probability in each subcarrier is determined by the fluctuations of the channel’s current frequency-domain channel transfer function with the aid of the channel transfer function H_n with the aid of the channel transfer function estimates provided by the pilot symbols, provided that no interference is present.” Keller at pp. 628-629 “In the Median system, the OFDM FFT length is 512, and each symbol is padded with a cyclic prefix of length 64. The sampling rate of the Median system is 225

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	Msamples/s, and the carrier frequency is 60 GHz. The uncoded target data rate of the Median system is 155 Mb/s.” Keller at p. 615. “As a further conceptual augmentation of the above ideas, let us consider the following example. The associated channel SNR of an adaptive OFDM modem is shown in a three-dimensional form in Fig. 15, which was generated with the aid of the FFT of the Rayleigh-faded CIR of Fig. 3.” Keller at p. 627. “The channel quality estimation can be acquired from a range of different sources. If the communication between the two stations is bidirectional and the channel can be considered reciprocal, then each station can estimate the channel quality on the basis of the received OFDM symbols and adapt the parameters of the local transmitter to this estimation.” Keller at p. 628. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol.” Keller at p. 629. “An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function.”

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	Keller at p. 633. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
9. The method as recited in claim 1, wherein said reverse path data signal includes identifiable training data.	Keller discloses The method as recited in claim 1, wherein said reverse path data signal includes identifiable training data. For example, see the following passages and/or figures, as well as all related disclosures: “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation.

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	This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “The estimate of the channel transfer function $\widehat{H_n}$ can be acquired by means of pilot-tone based channel estimation. More accurate measures of the channel transfer function can be gained by means of decision-directed or time-domain training sequence based techniques. The estimate of the channel transfer function does not take into account effects, such as cochannel or intersubcarrier interference. Alternative channel quality measures including interference effects can be devised on the basis of the error correction decoder’s soft output information or by means of decision-feedback local SNR estimations.” Keller at p. 629. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

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10. The method as recited in claim 9, further comprising: comparing said identifiable training data to a local version of said training data to identify said at least one multipath transmission delay within said reverse path data signal.	Keller discloses comparing said identifiable training data to a local version of said training data to identify said at least one multipath transmission delay within said reverse path data signal. For example, see the following passages and/or figures, as well as all related disclosures: “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “The estimate of the channel transfer function $\widehat{H_n}$ can be acquired by means of pilot-tone based channel estimation. More accurate measures of the channel transfer function can be gained by means of decision-directed or time-domain training sequence based techniques. The estimate of the channel transfer function does not take into account effects, such as cochannel or intersubcarrier interference.

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	Alternative channel quality measures including interference effects can be devised on the basis of the error correction decoder's soft output information or by means of decision-feedback local SNR estimations." Keller at p. 629. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
12. The method as recited in claim 3, wherein said at least one reverse transmission path is substantially reciprocal to said at least one forward transmission path.	Keller discloses wherein said at least one reverse transmission path is substantially reciprocal to said at least one forward transmission path. For example, see the following passages and/or figures, as well as all related disclosures: See discussion of 1[p], 1[a], 1[b] describing that the base station is a transmitting device (e.g., for the downlink OFDM symbols) and that it also determines the pre-equalization parameter and performs the modification of the forward path (downlink) data signal based on the reverse link. Indeed, the '369 acknowledges that reciprocity was already well-known prior to the '369 patent, particularly for TDD channels. See '369 patent at 7:22-34 ("**<u>As is well</u>**

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	known, many materials are electromagnetically isotropic, which is a property resulting from symmetry in their associated permittivity and permeability tensors. The Lorentz Reciprocity Theorem applies to such materials. Refraction and dielectric reflection from materials therefore often show reciprocity, or equivalence of forward and reverse channel characteristics. Diffraction and reflection are inherently reciprocal due to the minimal media affecting the electromagnetic wave. Thus, reciprocity can be used to determine channel characteristics that are used while pre-equalizing a transmitted path. The use of a reciprocal channel is very useful, for example, when Time Division Duplex (TDD) channels are implemented.”). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
13. The method as recited in claim 1, wherein identifying said at least one multipath transmission delay, determining said at least one forward path pre-equalization parameter, and modifying said forward path data signal are performed by a transmitting device.	Keller discloses wherein identifying said at least one multipath transmission delay, determining said at least one forward path pre-equalization parameter, and modifying said forward path data signal are performed by a transmitting device. For example, see the following passages and/or figures, as well as all related disclosures: “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel

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	estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel.” Keller at p. 629. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634.

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	“An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function.” Keller at p. 633. “Since no equalization is performed, there is no noise amplification at the receiver. Similarly to the adaptive modulation techniques illustrated above, preequalization is only applicable to a duplex link, since the transmitted signal is adapted to the specific channel conditions perceived by the receiver.” Keller at p. 634. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
14. The method as recited in claim 13, wherein said transmitting device includes a base station device that is operatively configured for use in a wireless communication system.	Keller discloses wherein said transmitting device includes a base station device that is operatively configured for use in a wireless communication system. For example, see the following passages and/or figures, as well as all related disclosures:

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	“High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “Based on the above advances in the field of OFDM modems, below we will characterize the expected performance of OFDM modems using the example of high-rate wireless asynchronous transfer mode (WATM) systems [76]–[78], [80], [81]. Specifically, the system parameters used in characterizing the performance of various OFDM algorithms closely followed the specifications of the ACTS Median system [76]–[79], which is a proposed wireless extension to fixed-wire ATM-type networks. In the Median system, the OFDM FFT length is 512, and each symbol is padded with a cyclic prefix of length 64. The sampling rate of the Median system is 225 Msamples/s, and the carrier frequency is 60 GHz. The uncoded target data rate of the Median system is 155 Mb/s.” Keller at p. 615.

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	One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
15. The method as recited in claim 13, further comprising: using at least one transmitting device receive antenna operatively coupled to said transmitting device to receive said reverse path data signal over at least one reverse transmission path from the receiving device.	Keller discloses using at least one transmitting device receive antenna operatively coupled to said transmitting device to receive said reverse path data signal over at least one reverse transmission path from the receiving device. For example, see the following passages and/or figures, as well as all related disclosures: “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation.

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	This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
19. The method as recited in claim 15, wherein said transmitting device is operatively coupled to a plurality of first device receive antennas.	Keller discloses wherein said transmitting device is operatively coupled to a plurality of first device receive antennas. For example, see the following passages and/or figures, as well as all related disclosures: “*4) Adaptive Antennas:* Combining adaptive antenna techniques with OFDM transmissions was shown to be advantageous in suppressing cochannel interference in cellular communications systems. Li *et al.* [53]–[56], Kim *et al.* [57], and Münster *et al.* [58] have investigated algorithms for multiuser channel estimation and interference suppression. The employment of adaptive antennas is always beneficial

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	in terms of mitigating the effects of multiuser interference, since with the aid of beam-steering it becomes possible to focus the receiver’s antenna beam on the served user, while attenuating the cochannel interferers. This is of particularly high importance in conjunction with OFDM, which exhibits a high sensitivity against cochannel interference, potentially hampering its application in cochannel interference limited multiuser scenarios.” Keller at p. 613. “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “We have seen above how the receiver’s estimate of the channel transfer function can be employed by the transmitter in order to dramatically improve the performance of an OFDM system by adapting the subcarrier modulation modes to the channel

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	conditions. For subchannels exhibiting a low signal-to-noise ratio, robust modulation modes are used, while for subcarriers having a high SNR, high-throughput multilevel modulation modes can be employed. An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function. We will highlight a range of related topics in this section.” Keller at p. 633. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references

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	identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
21. The method as recited in claim 15, wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: determining at least one angle of arrival of said reverse path data signal with respect to said at least one transmitting device receive antenna.	Keller discloses wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: determining at least one angle of arrival of said reverse path data signal with respect to said at least one transmitting device receive antenna. For example, see the following passages and/or figures, as well as all related disclosures: “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629.

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	One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
28. The method as recited in claim 13, further comprising: using at least one transmitting device transmit antenna operatively coupled to said transmitting device to transmit said modified forward path data signal over at least one forward transmission path to the receiving device.	Keller discloses using at least one transmitting device transmit antenna operatively coupled to said transmitting device to transmit said modified forward path data signal over at least one forward transmission path to the receiving device. For example, see the following passages and/or figures, as well as all related disclosures: “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.”

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	Keller at p. 629. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel.” Keller at p. 629. “Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634. “An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function.” Keller at p. 633. “Since no equalization is performed, there is no noise amplification at the receiver. Similarly to the adaptive modulation techniques illustrated above, preequalization is

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	only applicable to a duplex link, since the transmitted signal is adapted to the specific channel conditions perceived by the receiver.” Keller at p. 634. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
32. The method as recited in claim 28, further comprising: setting at least one antenna pointing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.	Keller discloses setting at least one antenna pointing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter. For example, see the following passages and/or figures, as well as all related disclosures: See discussion of 1[p], 1[a], 1[b]. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization

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	of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629 “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency f'_d. The ensemble of the propagation p paths constitutes the impulse response” Keller at p. 615. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

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33. The method as recited in claim 28, further comprising: setting at least one phased array antenna transmission directing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.	Keller discloses setting at least one phased array antenna transmission directing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter. For example, see the following passages and/or figures, as well as all related disclosures: See discussion of 1[p], 1[a], 1[b]. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629 “The channel model assumed in this paper is that of a finite impulse response (FIR) filter with time-varying tap values. Every propagation path is characterized by a fixed delay T_i and a time-varying amplitude $A_i(t) = a_i \cdot g_i(t)$, which is the product of a complex amplitude a_i and a Rayleigh fading process $g_i(t)$. The Rayleigh processes are independent from each other, but they all exhibit the same normalized Doppler frequency f'_d. The ensemble of the propagation p paths constitutes the impulse response” Keller at p. 615.

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	“Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. “While OFDM transmissions over mobile communications channels can alleviate the problem of multipath propagation, recent research efforts have focused on solving a set of inherent difficulties regarding OFDM, namely, on reducing the associated the peak-to-mean-power ratio fluctuation, on time and frequency synchronization and on mitigating the effects of cochannel interference sensitivity in multiuser environments.” Keller at p. 612 One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

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35. The method as recited in claim 28, further comprising: selecting said at least one transmitting device transmit antenna from a plurality of transmitting device transmit antennas that are each operatively coupled to said transmitting device.	Keller discloses selecting said at least one transmitting device transmit antenna from a plurality of transmitting device transmit antennas that are each operatively coupled to said transmitting device. For example, see the following passages and/or figures, as well as all related disclosures: “*4) Adaptive Antennas:* Combining adaptive antenna techniques with OFDM transmissions was shown to be advantageous in suppressing cochannel interference in cellular communications systems. Li *et al.* [53]–[56], Kim *et al.* [57], and Münster *et al.* [58] have investigated algorithms for multiuser channel estimation and interference suppression. The employment of adaptive antennas is always beneficial in terms of mitigating the effects of multiuser interference, since with the aid of beam-steering it becomes possible to focus the receiver’s antenna beam on the served user, while attenuating the cochannel interferers. This is of particularly high importance in conjunction with OFDM, which exhibits a high sensitivity against cochannel interference, potentially hampering its application in cochannel interference limited multiuser scenarios.” Keller at p. 613. “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself

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	by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “We have seen above how the receiver’s estimate of the channel transfer function can be employed by the transmitter in order to dramatically improve the performance of an OFDM system by adapting the subcarrier modulation modes to the channel conditions. For subchannels exhibiting a low signal-to-noise ratio, robust modulation modes are used, while for subcarriers having a high SNR, high-throughput multilevel modulation modes can be employed. An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function. We will highlight a range of related topics in this section.” Keller at p. 633. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be

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	exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of

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	ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
36. The method as recited in claim 35, further comprising: selectively transmitting a plurality of beams using two or more transmitting device transmit antennas.	Keller discloses selectively transmitting a plurality of beams using two or more transmitting device transmit antennas. For example, see the following passages and/or figures, as well as all related disclosures: “*4) Adaptive Antennas:* Combining adaptive antenna techniques with OFDM transmissions was shown to be advantageous in suppressing cochannel interference in cellular communications systems. Li *et al.* [53]–[56], Kim *et al.* [57], and Münster *et al.* [58] have investigated algorithms for multiuser channel estimation and interference suppression. The employment of adaptive antennas is always beneficial in terms of mitigating the effects of multiuser interference, since with the aid of beam-steering it becomes possible to focus the receiver’s antenna beam on the served user, while attenuating the cochannel interferers. This is of particularly high importance in conjunction with OFDM, which exhibits a high sensitivity against cochannel interference, potentially hampering its application in cochannel interference limited multiuser scenarios.” Keller at p. 613. “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the

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	receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “We have seen above how the receiver’s estimate of the channel transfer function can be employed by the transmitter in order to dramatically improve the performance of an OFDM system by adapting the subcarrier modulation modes to the channel conditions. For subchannels exhibiting a low signal-to-noise ratio, robust modulation modes are used, while for subcarriers having a high SNR, high-throughput multilevel modulation modes can be employed. An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function. We will highlight a range of related topics in this section.” Keller at p. 633. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a

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	base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629.

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	One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
37. The method as recited in claim 36, wherein each of said transmitted plurality of beams is selectively adjusted in phase and amplitude to reduce multipath affects when received by said receiving device.	Keller discloses wherein each of said transmitted plurality of beams is selectively adjusted in phase and amplitude to reduce multipath affects when received by said receiving device. For example, see the following passages and/or figures, as well as all related disclosures: “*4) Adaptive Antennas:* Combining adaptive antenna techniques with OFDM transmissions was shown to be advantageous in suppressing cochannel interference in cellular communications systems. Li *et al.* [53]–[56], Kim *et al.* [57], and Münster *et al.* [58] have investigated algorithms for multiuser channel estimation and interference suppression. The employment of adaptive antennas is always beneficial in terms of mitigating the effects of multiuser interference, since with the aid of beam-steering it becomes possible to focus the receiver’s antenna beam on the served user, while attenuating the cochannel interferers. This is of particularly high importance in conjunction with OFDM, which exhibits a high sensitivity against cochannel interference, potentially hampering its application in cochannel interference limited multiuser scenarios.”

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	Keller at p. 613. “High-data-rate communications are limited not only by noise but—especially with increasing symbol rates—often more significantly by the intersymbol interference (ISI) due to the memory of the dispersive wireless communications channel [1]. Explicitly, this channel memory is caused by the dispersive channel impulse response (CIR) due to the different-length propagation paths between the transmitting and the receiving antennas. This dispersion effect could theoretically be measured by transmitting an infinitely short impulse and ‘receiving’ the CIR itself. On this basis, several measures of the effective duration of the impulse response can be calculated, one being the delay spread. The multipath propagation of the channel manifests itself by different echos of possibly different transmitted symbols overlapping at the receiver, which leads to error rate degradation. This effect occurs not only in wireless communications but also over all types of electrical and optical waveguides, although for these media the relative time differences are comparatively small, mostly due to multimode transmission or incorrect electrical or optical termination at interfaces.” Keller at p. 611. “We have seen above how the receiver’s estimate of the channel transfer function can be employed by the transmitter in order to dramatically improve the performance of an OFDM system by adapting the subcarrier modulation modes to the channel conditions. For subchannels exhibiting a low signal-to-noise ratio, robust modulation modes are used, while for subcarriers having a high SNR, high-throughput multilevel modulation modes can be employed. An alternative approach to combating the frequency-selective channel behavior was proposed in [114], applying preequalization to the OFDM symbol prior to transmission on the basis of the anticipated channel transfer function. We will highlight a range of related topics in this section.”

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	Keller at p. 633. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission” so that then “At the receiver, no equalization is performed” Keller at p. 634. “In addition to improving the system’s BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be

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	exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station.” Keller at p. 629. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
41. The method as recited in claim 1, wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: sub-band equalizing said forward path data signal using corresponding frequency domain reverse path data.	Keller discloses wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: sub-band equalizing said forward path data signal using corresponding frequency domain reverse path data. For example, see the following passages and/or figures, as well as all related disclosures: “Preequalization for the OFDM modem operates by scaling the data symbol of subcarrier n, S_n, by a preequalization function E_n, computed from the inverse of the anticipated channel transfer function, prior to transmission.” Keller at p. 634.

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	"While OFDM transmissions over mobile communications channels can alleviate the problem of multipath propagation, recent research efforts have focused on solving a set of inherent difficulties regarding OFDM, namely, on reducing the associated the peak-to-mean-power ratio fluctuation, on time and frequency synchronization and on mitigating the effects of cochannel interference sensitivity in multiuser environments." Keller at p. 612 "In addition to improving the system's BER performance in time-dispersive channels, spectral preequalization can be employed in order to perform all channel estimation and equalization functions at only one of the two communicating duplex stations. Low-cost, low-power consumption mobile stations can communicate with a base station that performs the channel estimation and frequency-domain equalization of the up-link, and uses the estimated channel transfer function for preequalizing the down-link OFDM symbol. This setup would lead to different overall channel quality on the up-link and down-link, and the superior down-link channel quality could be exploited by using a computationally less complex channel decoder having weaker error correction capabilities in the mobile station than in the base station." Keller at p. 629. "If the channel's frequency-domain transfer function is to be fully counteracted by the spectral preequalization upon adapting the subcarrier power to the inverse of the channel transfer function, then the output power of the transmitter can become excessive, if heavily faded subcarriers are present in the system's frequency range. In order to limit the transmitter's maximal output power, hybrid channel preequalization and adaptive modulation schemes can be devised, which would deactivate transmission in deeply faded subchannels, while retaining the benefits of preequalization in the remaining subcarriers."

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	Keller at p. 629. “Based on the estimated frequency-domain channel transfer function, spectral preequalization at the transmitter of one or both communicating stations can be invoked, in order to partially or fully counteract the frequency-selective fading of the time-dispersive channel. Unlike frequency-domain equalization at the receiver—which corrects for the amplitude and phase errors inflicted upon the subcarriers by the channel—spectral preequalization at the OFDM transmitter can deliver near-constant signal-to-noise levels for all subcarriers. Hence the above concept can be interpreted as power control on a subcarrier-by-subcarrier basis.” Keller at p. 629. “In order to keep the system complexity low, the modulation mode was not varied on a subcarrier-by-subcarrier basis, but instead the totalOFDMbandwidth of 512 subcarrierswas split into blocks of adjacent subcarriers, referred to as subbands, and the same modulation scheme was employed for all subcarriers of the same subband. This substantially simplified the task of signaling the modem mode and rendered the employment of alternative blind detection mechanisms feasible, which will be discussed in Section VI-D.” Keller at p. 630. “Direct channel inversion at the transmitter is not practical, as the output power fluctuations are prohibitive; excluding those subcarriers that are faded too low can be used to limit the necessary transmit power. Analogously to the adaptive modulation schemes above, the transmitter decides for all subcarriers in each subband whether to transmit data or not.

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	If preequalization is possible under the power constraints, then the subcarriers are modulated with the preequalized data symbols. The information on whether a subband is used for transmission or not is signaled to the receiver. Since no attempt is made to transmit in the subbands that cannot be preequalized, the power not employed in the blank subcarriers can be used for “boosting” the data-bearing subbands. This scheme allows for a more flexible preequalization algorithm than the fixed-threshold-based method described above, which is summarized as follows. • Calculate the necessary transmit power p_n for each subband n, assuming perfect preequalization.” Keller at p. 634. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly Minn and/or Lehne. Rather than repeat those disclosures here, they are incorporated by reference into this chart.